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closely adjacent a second side of said physical obstruction, converting said sonic signal into a second electric signal at said second location and storing said second electric signal for subsequent retrieval.

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9. (Amended) Apparatus according to claim 6, in which the data parameter converting means is a fluid pressure transducer for monitoring fluid pressure below said obstruction.

REMARKS

Claims 1- 6 and 8 - 13 stand rejected as being obvious in the light of Montgomery or Bockhorst when taken in combination with Grossman and Close et al or Arriens.

Claim 1 has been amended to clarify and simplify the definition of the claimed method.

It is noted that the Examiner accepts that independent claims 1 and 6 are novel over the prior art of record, but argues that the subject matter of the claims is obvious in the light of the prior art. It is submitted that the Examiner's reasoning in reaching this conclusion is erroneous, and that the subject matter of claims 1 and 6 is non-obvious.

The Examiner has stated that sonic signal transmission along a pipe is "conventional". This is strenuously denied. As has previously been noted, there have been numerous proposals in the prior art for sonic signal transmission along drill strings. All of these proposals have essentially sought to use sonic

signal transmission as a replacement for conventional electrical signal transmission over substantial distances along a drill string (typically between the surface and a downhole location). None of these proposals has been successfully implemented in practice. Accordingly, it cannot reasonably be said that sonic signal transmission is in any way "conventional" in the art. The difficulties encountered in the practical implementation of sonic signal transmission over long distances do not arise simply because of external noise sources as encountered in LWD and MWD. The problems arise because the drill string does not provide a simple, homogeneous acoustic transmission medium. Reflections of the acoustic energy occur at the joints between lengths of drill pipe causing signal attenuation and complex interference. The propagation of acoustic signals along substantial lengths of drill string are thus inherently problematic, regardless of any external noise sources, contrary to the Examiner's assertion.

Sonic transmission along a pipe cannot be said to be "conventional", as asserted by the Examiner. Such systems have not been widely used in practice because of the problems noted above. Accordingly, the skilled person would be unlikely to consider sonic transmission as providing a potential solution to any particular downhole communications problem.

It is submitted that the particular combination of features defined in the independent claims is non-obvious. In the light of the prior art of record, it is non-obvious to use sonic signal transmission in the particular manner defined in the claims. With regard to the Examiner's comment that the claims do not

"recite the length of tube over which communication is consummated", it is noted that the independent claims each refer to acoustic transmission from one side to another of an obstruction in the internal bore of an elongate tubular member. This implies a relatively short path length through a substantially homogeneous transmission medium.

The present invention exploits the idea of acoustic data transmission by using it for data transmission over a relatively short path length, in circumstances where the conventional data transmission path (e.g. electrical or hydraulic) is blocked by an obstruction such as a shut-in valve. This allows acoustic data transmission to be applied in a situation where it can be reliably employed, in view of the short path length, to provide a bridge past an obstruction which would block a conventional electrical or hydraulic) data transmission system. Such obstructions would otherwise require complex mechanical arrangements in order to be by-passed by electrical or hydraulic systems, as discussed in the introductory part of the present application.

It is submitted that the Examiner's rejection of the claims as being obvious is predicated entirely on hindsight analysis, based on the erroneous assertion that sonic signal transmission can be regarded as "conventional" in the art and a misunderstanding of the problems associated with previous proposals employing sonic signal transmission. There is no reason to suppose that the skilled artisan, even having a wide knowledge of downhole data transmission and retrieval systems and/or applying common knowledge and common sense,

would consider combining the particular teachings of the prior art of record in such a way as to arrive at the subject matter defined in the present claims.

The subject matter of the present claims embodies a non-obvious and inventive step in recognizing that sonic signal transmission, which had only previously been considered for long range signal transmission and which had never previously been used successfully because of inherent technical difficulties, could usefully and advantageously be employed in combination with conventional electrical transmission methods for the specific purpose of transmitting data over a short path length past an obstruction in a pipe.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (Amended) A method of transmitting data in a borehole, the method comprising providing ~~an~~ a first electric signal representative of the data to be transmitted, converting said first electric signal into a sonic signal at a first location closely adjacent one side of a physical obstruction in an internal bore of an elongate tubular member and propagating said sonic signal along ~~an~~ said elongate tubular member ~~having an internal bore, said data being transmitted~~ from ~~one side~~ said first location to ~~the other~~ a second location closely adjacent a second side of ~~a~~ said physical obstruction ~~in the internal bore of said elongate tubular member, the conversion of the electric signal into the sonic signal being effected at a first location on said one side; characterised in that said first location is closely adjacent said obstruction on said one side~~, converting said sonic signal ~~is converted~~ into ~~an electrical~~ a second electric signal ~~on said other side of said obstruction~~ at ~~a~~ said second location ~~closely adjacent said obstruction on said other side~~ and storing said ~~data is stored on said other side~~ second electric signal for subsequent retrieval.

9. (Amended) Apparatus according to claim ~~7~~ 6, in which the data parameter converting means is a fluid pressure transducer for monitoring fluid pressure below said obstruction.